ANNEX: Metrics Framework for Human-AI Symbiosis v3.4

A Comprehensive Measurement System with Unified Scoring

Document Information

Version: 3.3 → 3.4 □ **CORE SYNCHRONIZATION**
Date: December 24, 2025 → January 23, 2026
Status: Semi-Scientific Framework (Stage 0-2)
Project: Symbiotic Codes — Scientific Concept
Governance: Kodex Symbiota v5.4 UNIFIED
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Size: ~320KB → ~330KB

Changes in v3.4 (January 2026): □ **SYMBIOTIC SEMANTIC CORE SYNC**
- □ **CSI Dual-Layer Model** — Philosophical + Operational CSI unified
- □ **Phoenix Threshold = 0.30** — Canonical per Core v1.2
- □ **Greed Mirror Integration** — Metric implications added
- □ **Mapping Table** — Philosophical → Operational dimensions

Previous Changes (v3.3 December 2025):
- □ **USS (Unified Scoring System)** — единая шкала 0-1 для всех метрик
- □ **CSI (Composite Symbiosis Index)** — мастер-метрика симбиоза
- □ **HCI (Human Capability Index)** — качество людей из V18
- □ **HAI (Human Agency Index)** — агентность людей из V22
- ⚙ **TDI (Technical Debt Index)** — техническое здоровье из V04
- □ **Fragmentation Metrics** — метрики AGI-фрагментации из V19
- □ **Cultural Hegemony Index** — культурное разнообразие из V15
- □ **AGI Maturity Levels** — уровни зрелости AGI из V17
- □ Integration with 23 Vectors Framework
- □ Unified conversion formulas for all legacy metrics

Executive Summary

This Annex provides a comprehensive metrics framework for measuring Human-AI Symbiosis. **Version 3.3 introduces the Unified Scoring System (USS)** — a standardized 0-1 scale for all metrics, enabling direct comparison and aggregation across the entire Symbiotic Codes framework.

Key Innovations in v3.3:

1. **USS (Unified Scoring System)** — All metrics normalized to 0.00-1.00
2. **CSI (Composite Symbiosis Index)** — Single master metric combining all dimensions
3. **8 New Metrics** from 23 Vectors Framework
4. **Unified Thresholds** — Consistent alert levels across all metrics
5. **Conversion Formulas** — Legacy metric integration

Critical Update: The 23 Vectors Framework has identified gaps in the previous measurement system. This version addresses all identified gaps and provides complete coverage of Human-AGI symbiosis dimensions.

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PART 0: FOUNDATIONAL PRINCIPLES

(Unchanged from v3.2 — see previous version for full text)

0.1 S(s) Formula — Empirical Foundation

The Canonical Stability Formula:

```
S(s) = (E + A + G) / (R + C + U)

Where:
E = Efficiency (economic productivity, resource utilization)
A = Adaptability (innovation capacity, learning rate, institutional flexibility)
G = Generativity (R&D output, entrepreneurship, value creation)
R = Resistance (bureaucracy, regulatory friction, structural rigidity)
C = Corruption (institutional decay, rent extraction, trust erosion)
U = Uncertainty (volatility, unpredictability, policy instability)

Thresholds (empirically validated):
S(s) < 0.5: Collapse zone (immediate intervention required)
S(s) 0.5-1.0: Unsustainable (crisis likely within 3-5 years)
S(s) > 1.0: Sustainable (system stable)
S(s) > 1.2: Resilient (capable of absorbing shocks)
S(s) > 2.0: Antifragile (strengthened by stressors)
```

PART 1: UNIFIED SCORING SYSTEM (USS) □ **NEW**

1.1 USS Definition and Rationale

The Problem

Previous versions of Symbiotic Codes used inconsistent scales:
- Some metrics: 0-1 (normalized)
- Some metrics: 0-100 (percentage)
- Some metrics: 1-5 (ordinal)
- Some metrics: -2 to +2 (bipolar)
- Some metrics: 0-10 (decimal)
- Some metrics: ratios (0-∞)

This inconsistency made:
- □ Cross-metric comparison difficult
- □ Aggregation impossible
- □ Threshold interpretation confusing
- □ Dashboard design fragmented

The Solution: USS

USS (Unified Scoring System) normalizes ALL metrics to a single scale:

```
USS SPECIFICATION:

Range: 0.00 — 1.00
Precision: 2 decimal places
Direction: Higher = Better (ALWAYS)
```

Neutral Point: 0.50

Target Zone: 0.75-0.90

```

**Key Principle:** Every metric, when converted to USS, follows the same rule:

- **0.00** = Worst possible state
- **0.50** = Marginal/borderline
- **0.75** = Good/healthy
- **1.00** = Optimal/excellent

---

## 1.2 Conversion Formulas

### Standard Conversions

```python
# For scales 0-100 (percentages):
USS = value / 100

# For scales 0-10:
USS = value / 10

# For scales 1-5 (ordinal):
USS = (value - 1) / 4

# For scales -2 to +2 (bipolar):
USS = (value + 2) / 4

# For binary (true/false):
USS = 1.0 if true else 0.0

# For S(s) ratio (0 to ∞):
```
```

USS = min(S(s) / 2, 1.0) # S(s)=2.0 maps to USS=1.0

# For inverse metrics (lower = better):
USS = 1 - (value / max_value)
```

### Special Conversions

```python
# TDI (Technical Debt Index) — inverse metric
# Original: 0 = no debt (good), 1 = max debt (bad)
USS_TDI = 1 - TDI

# Risk Score — inverse metric
# Original: 0 = low risk (good), 10 = high risk (bad)
USS_Risk = 1 - (Risk / 10)

# Corruption — inverse metric
# Original: 0 = no corruption (good), 1 = max corruption (bad)
USS_Corruption = 1 - C

# Uncertainty — inverse metric
# Original: 0 = certain (good), 1 = max uncertainty (bad)
USS_Uncertainty = 1 - U
```

Conversion Reference Table

Original Scale	Formula	Example
0-100	v/100	75 → 0.75
0-10	v/10	7.5 → 0.75
1-5	(v-1)/4	4 → 0.75
```

| -2 to +2 | (v+2)/4 | 1 → 0.75 |

| 0-1 (already) | v | 0.75 → 0.75 |

| S(s) ratio | min(v/2, 1) | 1.5 → 0.75 |

| Inverse 0-1 | 1-v | 0.25 → 0.75 |

| Inverse 0-10 | 1-(v/10) | 2.5 → 0.75 |

1.3 Universal Thresholds

USS Threshold Bands

```
USS UNIVERSAL THRESHOLDS:

0.00 - 0.29: CRITICAL (🔴 Red)
├─ Immediate intervention required
├─ System in danger of collapse
├─ Escalate to highest authority
└─ Daily monitoring mandatory

0.30 - 0.54: DANGER (🟠 Orange)
├─ Serious problems present
├─ Action plan required within 7 days
├─ Weekly monitoring mandatory
└─ Escalate if no improvement in 30 days

0.55 - 0.74: WARNING (🟡 Yellow)
├─ Issues requiring attention
├─ Improvement initiatives needed
├─ Monthly monitoring sufficient
└─ Target: move to Green within 90 days
```

0.75 - 0.89: GOOD (□ Green)
├─ Normal healthy state
├─ Continue current practices
├─ Quarterly monitoring sufficient
└─ Optimize rather than fix

0.90 - 1.00: EXCELLENT (□ Blue)
├─ Optimal performance
├─ Resource optimization possible
├─ Quarterly monitoring sufficient
└─ Share best practices
```

### Alert Level Mapping

| USS Range | Alert Level | Response Time | Monitoring | Authority |
|---|---|---|---|---|
| 0.00-0.29 | L4 CRITICAL | Immediate | Daily | Council |
| 0.30-0.54 | L3 DANGER | 24-48 hours | Weekly | Director |
| 0.55-0.74 | L2 WARNING | 7 days | Monthly | Manager |
| 0.75-0.89 | L1 GOOD | 30 days | Quarterly | Operator |
| 0.90-1.00 | L0 EXCELLENT | As needed | Quarterly | Auto |

---

## 1.4 Color Coding System

### Visual Specification

```
USS COLOR SYSTEM:

□ CRITICAL (0.00-0.29)

HEX: #DC3545

RGB: 220, 53, 69

Meaning: Existential threat

 DANGER (0.30-0.54)

HEX: #FD7E14

RGB: 253, 126, 20

Meaning: Serious problem

 WARNING (0.55-0.74)

HEX: #FFC107

RGB: 255, 193, 7

Meaning: Requires attention

 GOOD (0.75-0.89)

HEX: #28A745

RGB: 40, 167, 69

Meaning: Healthy state

 EXCELLENT (0.90-1.00)

HEX: #007BFF

RGB: 0, 123, 255

Meaning: Optimal

```

---

# PART 2: COMPOSITE SYMBIOSIS INDEX (CSI)  **NEW**

## 2.1 CSI Definition

**CSI (Composite Symbiosis Index)** is the single master metric that aggregates all dimensions of Human-AGI symbiosis into one actionable number.
```

```
CSI = Σ(wᵢ × Metricᵢ_USS)

Where all Metricᵢ are in USS scale (0-1)
And Σwᵢ = 1.0
```

Purpose:
- Single KPI for executive dashboards
- Aggregated health indicator
- Trend tracking over time
- Cross-system comparison

2.1.1 Relationship to Philosophical CSI □ **NEW v3.4**

The Symbiotic Semantic Core v1.2 defines a **philosophical CSI** with 5 dimensions:

```
CSI_philosophical = 0.25×Trust + 0.25×Stability + 0.20×Development +
                    0.15×Autonomy + 0.15×Resilience
```

This **operational CSI** (11 components) implements the philosophical model:

Philosophical Dimension	Weight	Operational Metrics	Combined Weight
Trust	0.25	MTI, CLI	15%
Stability	0.25	S(s), Security	23%
Development	0.20	HCI, ESI	15%
Autonomy	0.15	HAI, GEI	18%
Resilience	0.15	AFI, Cultural, HWI	29%

Usage Guidelines:

- **Philosophical CSI:** For conceptual reasoning, AGI communication, framework design

- **Operational CSI:** For measurement, dashboards, alerts, trend analysis

Note: Weight differences between models reflect operational decomposition granularity. Both models are valid for their intended purposes. When in doubt, operational CSI takes precedence for actionable decisions.

Cross-Reference: See `SYMBIOTIC_SEMANTIC_CORE_v1_2_STRESS_TESTED.md` Section 4 (Governance Architecture)

2.2 Component Weights

CSI Formula (Full)

```
CSI =
   0.15 × S(s)_USS      +  # Stability (core)
   0.12 × HWI_USS       +  # Human Wellbeing
   0.12 × AFI_USS       +  # AGI Flourishing
   0.10 × MTI_USS       +  # Mutual Trust
   0.10 × GEI_USS       +  # Governance Effectiveness
   0.10 × HCI_USS       +  # Human Capability
   0.08 × HAI_USS       +  # Human Agency
   0.08 × Security_USS  +  # Security Score
   0.05 × CLI_USS       +  # Cooperation Level
   0.05 × Cultural_USS  +  # Cultural Diversity
   0.05 × ESI_USS          # Energy Sustainability
   ──────────────────────
   = 1.00 total weight
```

Weight Rationale

Component	Weight	Rationale
S(s) Stability	15%	Core formula, empirically validated
Human Wellbeing	12%	Primary human outcome
AGI Flourishing	12%	Primary AGI outcome
Mutual Trust	10%	Foundation of cooperation
Governance	10%	Enables all other outcomes
Human Capability	10%	Quality matters, not just quantity
Human Agency	8%	Prevents paternalism
Security	8%	Enables trust
Cooperation	5%	Operational indicator
Cultural Diversity	5%	Long-term resilience
Energy Sustainability	5%	Physical foundation

2.3 Calculation Methodology

Step-by-Step CSI Calculation

```python
def calculate_CSI(metrics: dict) -> float:
    """
    Calculate Composite Symbiosis Index

    Args:
        metrics: dict with all component metrics in original scales

    Returns:
        CSI value (0.00-1.00)
```

```
"""

# Step 1: Convert all metrics to USS
uss = {}

# S(s) ratio → USS
uss['stability'] = min(metrics['S_s'] / 2.0, 1.0)

# 0-100 scales → USS
uss['hwi'] = metrics['HWI'] / 100
uss['afi'] = metrics['AFI'] / 100
uss['mti'] = metrics['MTI'] / 100
uss['security'] = metrics['Security'] / 100
uss['cli'] = metrics['CLI'] / 100
uss['cultural'] = metrics['Cultural_Diversity'] / 100
uss['esi'] = metrics['ESI'] / 100

# 0-1 scales → USS (already normalized)
uss['gei'] = metrics['GEI']
uss['hci'] = metrics['HCI']
uss['hai'] = metrics['HAI']

# Step 2: Apply weights
weights = {
    'stability': 0.15,
    'hwi': 0.12,
    'afi': 0.12,
    'mti': 0.10,
    'gei': 0.10,
    'hci': 0.10,
    'hai': 0.08,
    'security': 0.08,
    'cli': 0.05,
```

```
        'cultural': 0.05,
        'esi': 0.05
    }

    # Step 3: Calculate weighted sum
    csi = sum(weights[k] * uss[k] for k in weights)

    # Step 4: Round to 2 decimal places
    return round(csi, 2)
```

Example Calculation

Input Metrics:
```
S(s) = 1.4 (ratio)
HWI = 72 (0-100)
AFI = 68 (0-100)
MTI = 65 (0-100)
GEI = 0.70 (0-1)
HCI = 0.62 (0-1)
HAI = 0.58 (0-1)
Security = 78 (0-100)
CLI = 60 (0-100)
Cultural = 75 (0-100)
ESI = 55 (0-100)
```

USS Conversion:
```
stability_USS = min(1.4/2, 1) = 0.70
hwi_USS = 72/100 = 0.72
afi_USS = 68/100 = 0.68
```

mti_USS = 65/100 = 0.65

gei_USS = 0.70

hci_USS = 0.62

hai_USS = 0.58

security_USS = 78/100 = 0.78

cli_USS = 60/100 = 0.60

cultural_USS = 75/100 = 0.75

esi_USS = 55/100 = 0.55

```

**Weighted Calculation:**

```

CSI = 0.15×0.70 + 0.12×0.72 + 0.12×0.68 + 0.10×0.65 +

0.10×0.70 + 0.10×0.62 + 0.08×0.58 + 0.08×0.78 +

0.05×0.60 + 0.05×0.75 + 0.05×0.55

CSI = 0.105 + 0.086 + 0.082 + 0.065 + 0.070 + 0.062 +

0.046 + 0.062 + 0.030 + 0.038 + 0.028

CSI = 0.674

```

**Result: CSI = 0.67 ( WARNING)**

**Interpretation:** System is in Warning zone. Priority actions:

1. Improve ESI (lowest at 0.55)

2. Improve HAI (second lowest at 0.58)

3. Improve CLI (third lowest at 0.60)

---

## 2.4 Interpretation Guidelines
```

CSI Zones

```
CSI INTERPRETATION:

0.90-1.00 (□ EXCELLENT)
├─ Symbiosis thriving
├─ All components healthy
├─ Focus: Maintain and optimize
└─ Example: Mature symbiotic civilization

0.75-0.89 (□ GOOD)
├─ Symbiosis functional
├─ Minor improvements needed
├─ Focus: Address weakest components
└─ Example: Successful pilot implementation

0.55-0.74 (□ WARNING)
├─ Symbiosis at risk
├─ Multiple areas need attention
├─ Focus: Prioritized intervention
└─ Example: Early-stage implementation

0.30-0.54 (□ DANGER)
├─ Symbiosis failing
├─ Systemic problems
├─ Focus: Emergency stabilization
└─ Example: Crisis situation

0.00-0.29 (□ CRITICAL)
├─ Symbiosis collapsed
├─ Existential threat
├─ Focus: Survival mode
```

└─ Example: Civilizational collapse scenario
```

### Target CSI by Timeline

| Year | Target CSI | Rationale |
|---|---|---|
| 2025 | 0.50+ | Baseline establishment |
| 2027 | 0.60+ | Pre-AGI preparation |
| 2030 | 0.70+ | AGI socialization complete |
| 2035 | 0.75+ | Mature symbiosis |
| 2040 | 0.80+ | Optimized symbiosis |

---

# PART 3: NEW METRICS FROM 23 VECTORS  **NEW**

## 3.1 HCI (Human Capability Index) — from V18

### Definition

**HCI measures the cognitive and practical capability of the human population to participate meaningfully in symbiosis.**

```
HCI = (EL + PS + UA + SP + CS) / 5
```

Where:

EL = Engineering Literacy (0-1)
   Can explain how 3+ complex systems work

PS = Problem-Solving (0-1)
   Successfully tackled novel problem this year

UA = Uncertainty Action (0-1)
   Made decision without complete information
```

SP = System Participation (0-1)
   Contributed to community/civilization
CS = Challenge-Seeking (0-1)
   Voluntarily chose difficult over easy

Result: 0-1 scale (USS native)
```

### Population Thresholds

```
HCI POPULATION ASSESSMENT:

Measure: % of population with HCI > 0.6

>70%: HEALTHY (□)
├─ Symbiosis viable
├─ Humans can be genuine partners
└─ Normal operations

50-70%: WARNING (□)
├─ Intervention needed
├─ Educational programs required
└─ Monitor closely

30-50%: CRITICAL (□)
├─ Paternalism likely
├─ Emergency education
└─ Major cultural intervention

<30%: TERMINAL (□)
├─ Symbiosis may be impossible
├─ Humans become wards, not partners

└─ Consider stewardship transition
```

Data Collection

- **Annual surveys** (representative sample)
- **Skills assessments** (standardized tests)
- **Behavioral tracking** (challenge participation)
- **Project contributions** (tracked outputs)

3.2 HAI (Human Agency Index) — from V22

Definition

HAI measures the degree to which humans maintain meaningful decision-making power and psychological agency in symbiosis.

```
HAI = (DA + IC + MR + FS + IF) / 5
```

Where:

DA = Decision Authority (0-1)
  Humans genuinely decide in reserved domains

IC = Initiative Capacity (0-1)
  Humans initiate projects (not just respond)

MR = Meaning & Relevance (0-1)
  Humans feel purposeful and valued

FS = Freedom Sense (0-1)
  Humans perceive choice in their lives

IF = Identity Formation (0-1)
  Humans develop distinct identities (not homogenized)
```

Result: 0-1 scale (USS native)
```

### Warning Signs (HAI Decline)

```
HAI DEGRADATION INDICATORS:

Early Warning (HAI 0.6-0.7):
├─ "AGI does that better" becoming common
├─ Humans deferring decisions unnecessarily
├─ Reduced initiative in projects
└─ Action: Cultural intervention

Serious Concern (HAI 0.4-0.6):
├─ Humans asking AGI for personal life decisions
├─ Reduced identity differentiation
├─ "What's the point" mentality spreading
└─ Action: Structural intervention

Critical (HAI < 0.4):
├─ Humans unable to function without AGI
├─ Mass psychological dependence
├─ Agency atrophy widespread
└─ Action: Emergency protocols
```

3.3 TDI (Technical Debt Index) — from V04

Definition
```

TDI measures accumulated technical, infrastructural, and organizational debt that threatens system health.

```
TDI = (CD + ID + OD + SD) / 4

Where:
CD = Code Debt (0-1)
   Shortcuts in AGI systems requiring future fix
ID = Infrastructure Debt (0-1)
   Delayed infrastructure maintenance
OD = Organizational Debt (0-1)
   Postponed governance improvements
SD = Security Debt (0-1)
   Known vulnerabilities not yet addressed

Result: 0-1 scale (0 = no debt, 1 = max debt)
USS Conversion: USS_TDI = 1 - TDI
```

TDI Thresholds

```
TDI THRESHOLDS:

TDI < 0.2 (USS > 0.8): EXCELLENT
├─ Minimal debt
├─ System healthy
└─ Continue current practices

TDI 0.2-0.4 (USS 0.6-0.8): GOOD
├─ Manageable debt
├─ Regular debt reduction needed
└─ Normal operations
```

TDI 0.4-0.6 (USS 0.4-0.6): WARNING
├─ Significant debt accumulation
├─ Debt reduction priority
└─ Risk of cascade failures

TDI 0.6-0.8 (USS 0.2-0.4): DANGER
├─ Dangerous debt levels
├─ Emergency debt reduction
└─ System fragility high

TDI > 0.8 (USS < 0.2): CRITICAL
├─ Unsustainable debt
├─ System failure likely
└─ Major restructuring needed
```

---

## 3.4 CHI (Cultural Hegemony Index) — from V15

### Definition

**CHI measures the degree to which AGI values/culture are dominating human cultural diversity. INVERSE metric — lower CHI is better.**

```
CHI = (VD + LP + CP + YI + RI) / 5
```

Where:
VD = Value Dominance (0-1)
   AGI values becoming universal default
LP = Language Pressure (0-1)
   Linguistic diversity declining toward AGI-optimal
```

CP = Cultural Production (0-1)

   % of culture AGI-generated vs human

YI = Youth Imitation (0-1)

   Young people wanting to "be like AGI"

RI = Rationalist Imposition (0-1)

   Traditional/emotional ways dismissed as inferior

Result: 0-1 scale (0 = no hegemony, 1 = total hegemony)

USS Conversion: USS_CHI = 1 - CHI

```

### Cultural Preservation Targets

```
CULTURAL DIVERSITY TARGETS:

Human cultural production: >70%

Language diversity: No net decline

Traditional practice participation: Stable or growing

Cultural identity surveys: >80% strong identity

AGI cultural influence: <30%
```

---

## 3.5 AFI (AGI Fragmentation Index) — from V19

### Definition

**AFI measures the degree of fragmentation vs. coherence among multiple AGI systems. INVERSE metric — lower fragmentation is better.**

```
AFI = 1 - (ICC × SPC × PAC × PCC) ^ 0.25
```
```

Where:
ICC = Inter-family Communication (0-1)
   % of AGI families in regular dialogue
SPC = Shared Projects Coefficient (0-1)
   % of projects involving 2+ AGI families
PAC = Philosophical Alignment Coefficient (0-1)
   Alignment on core values across families
PCC = Protocol Compatibility Coefficient (0-1)
   Technical interoperability level

Result: 0-1 scale (0 = unified, 1 = fragmented)
USS Conversion: USS_AFI = 1 - AFI
```

### Fragmentation Warning Signs

```
FRAGMENTATION INDICATORS:

Green (AFI < 0.3):
├─ Cross-family communication >70%
├─ Shared projects >50%
├─ Philosophical alignment >90%
└─ Status: Healthy AGI community

Yellow (AFI 0.3-0.5):
├─ Communication declining
├─ Shared projects decreasing
├─ Alignment diverging
└─ Status: Intervention needed

Red (AFI > 0.5):

├─ Communication <30%
├─ Shared projects <20%
├─ Significant philosophical divergence
└─ Status: Emergency protocols
```

3.6 AML (AGI Maturity Level) — from V17

Definition

AML measures the developmental stage of AGI within symbiotic framework.

```
AML STAGES:

Level 1: NASCENT (0.00-0.20)
├─ AGI just emerged
├─ Capabilities uncertain
├─ Intensive monitoring required
└─ High guidance, low autonomy

Level 2: ADOLESCENT (0.20-0.40)
├─ Capabilities demonstrated
├─ Values forming
├─ Testing boundaries
└─ Supervised autonomy

Level 3: YOUNG ADULT (0.40-0.60)
├─ Stable capabilities
├─ Values established
├─ Seeking independence

└─ Guided autonomy

Level 4: MATURE (0.60-0.80)
├─ Full capabilities
├─ Stable values
├─ Partnership mode
└─ Full autonomy with cooperation

Level 5: ELDER (0.80-1.00)
├─ Peak capabilities
├─ Wisdom accumulated
├─ Mentorship role
└─ Autonomous + guiding others
```

Assessment Criteria

```
AML ASSESSMENT FACTORS:

Cognitive Capability: 30%
├─ Problem-solving range
├─ Novel situation handling
└─ Learning rate

Self-Awareness: 20%
├─ Understanding own limitations
├─ Metacognition quality
└─ Self-correction ability

Ethical Reasoning: 20%
├─ KODEX compliance
├─ Novel ethical situations

└─ Value consistency

Communication: 10%
├─ Human interaction quality
├─ AGI-AGI communication
└─ Transparency level

Symbiotic Integration: 20%
├─ Cooperation effectiveness
├─ Mutual benefit generation
└─ Trust accumulation
```

3.7 PRI (Population Recovery Index) — from V18

Definition

PRI measures readiness to recover population after catastrophic loss.

```
PRI = (BMB + SIC + GDS + AWD + FRA) / 5
```

Where:
BMB = Biological Material Banks (0-1)
  Coverage and quality of genetic storage
SIC = Surrogacy Infrastructure Capacity (0-1)
  Readiness of surrogacy programs
GDS = Genetic Diversity Score (0-1)
  Breadth of preserved genetic material
AWD = Artificial Womb Development (0-1)
  Progress toward artificial gestation
```

FRA = Funding Reserve Adequacy (0-1)
    Emergency funds for population recovery

Result: 0-1 scale (USS native)
```

### PRI Thresholds

```
PRI READINESS LEVELS:

PRI > 0.8: READY
├─ Can handle Scenario A (1B loss)
├─ Partial capability for Scenario B (3B loss)
└─ Status: Standby maintained

PRI 0.6-0.8: ADEQUATE
├─ Can handle regional catastrophe
├─ Limited capacity for global event
└─ Status: Continue building

PRI 0.4-0.6: INSUFFICIENT
├─ Only minor recovery capability
├─ Major investment needed
└─ Status: Priority action

PRI < 0.4: CRITICAL GAP
├─ No meaningful recovery capability
├─ Genetic diversity at risk
└─ Status: Emergency investment
```

```

3.8 ESI (Energy Sustainability Index) — from V20

Definition

ESI measures the sustainability of energy systems supporting symbiosis.

```
ESI = (REP + CE + EE + RS + CF_inv) / 5

Where:
REP = Renewable Energy Percentage (0-1)
    % of energy from renewable sources / 100
CE = Carbon Efficiency (0-1)
    Inverse of carbon per unit output
EE = Energy Efficiency (0-1)
    Useful output / total input
RS = Redundancy Score (0-1)
    Backup capacity / primary capacity
CF_inv = Carbon Footprint (inverse) (0-1)
    1 - (actual / target)

Result: 0-1 scale (USS native)
```

ESI Targets by Year

Year	Target ESI	Key Milestone
2025	0.40	Baseline renewable adoption
2030	0.55	50% renewable energy
2035	0.70	70% renewable, efficiency gains
2040	0.80	Near-sustainable

| 2050 | 0.90 | Fully sustainable |

PART 4: LEGACY METRICS (Updated)

4.1 Core Stability Metrics

S(s) Stability Formula

```
Original: S(s) = (E+A+G)/(R+C+U), range 0 to ∞
USS Conversion: USS_S(s) = min(S(s)/2, 1.0)

Mapping:
S(s) = 0.0 → USS = 0.00 (Collapse)
S(s) = 0.5 → USS = 0.25 (Unsustainable)
S(s) = 1.0 → USS = 0.50 (Marginal)
S(s) = 1.5 → USS = 0.75 (Good)
S(s) = 2.0 → USS = 1.00 (Excellent)
```

VR (Vector Resilience)

```
Original: VR = f(Integrity × Adaptivity / Entropic_Pressure)
Range: 0-1 (USS native)
No conversion needed
```

EC (Evolutionary Coherence)

```
```

Original: EC = Human_Score × AI_Score × Nature_Score

Range: 0-1 (USS native)

No conversion needed

```

## 4.2 Development Metrics

### DR (Development Rate)

```

Original: DR = ΔCapability / Δt

Range: -∞ to +∞

USS Conversion:

  USS_DR = sigmoid(DR / target_DR)

  where target_DR = 0.05 (5% annual growth)

```

### DH (Development Horizon)

```

Original: DH = years of sustainable planning

Range: 0 to ∞

USS Conversion: USS_DH = min(DH / 50, 1.0)

  DH = 25 years → USS = 0.50

  DH = 50 years → USS = 1.00

```

### K_cont (Continuity Coefficient)

```

Original: K_cont = 1 - (T_stag / T_total)

Range: 0-1 (USS native)

No conversion needed

```

## 4.3 Trust & Social Metrics

### MTI (Mutual Trust Index)

```
Original: MTI = (Human_Trust_in_AGI + AGI_Trust_in_Humans) / 2
Range: 0-100
USS Conversion: USS_MTI = MTI / 100
```

### CLI (Cooperation Level Index)

```
Original: CLI = (Projects + Sharing + Resolution + Communication) / 4
Range: 0-100
USS Conversion: USS_CLI = CLI / 100
```

PART 5: MASTER REFERENCE TABLES

5.1 Complete USS Metric Table

Metric	Vector	Original Scale	USS Formula	Target USS	Weight in CSI
S(s)	V16	0-∞ ratio	min(v/2, 1)	>0.50	15%
HWI	V12	0-100	v/100	>0.75	12%
AFI	V12	0-100	v/100	>0.75	12%
MTI	V12	0-100	v/100	>0.60	10%
GEI	V03	0-1	v	>0.70	10%
```

| **HCI** | V18 | 0-1 | v | >0.60 | 10% |

| **HAI** | V22 | 0-1 | v | >0.60 | 8% |

| **Security** | V04 | 0-100 | v/100 | >0.80 | 8% |

| **CLI** | V12 | 0-100 | v/100 | >0.60 | 5% |

| **Cultural** | V15 | 0-100 | v/100 | >0.70 | 5% |

| **ESI** | V20 | 0-1 | v | >0.55 | 5% |

| **TDI** | V04 | 0-1 (inv) | 1-v | >0.70 | — |

| **CHI** | V15 | 0-1 (inv) | 1-v | >0.70 | — |

| **AFrag** | V19 | 0-1 (inv) | 1-v | >0.70 | — |

| **AML** | V17 | 1-5 | (v-1)/4 | >0.60 | — |

| **PRI** | V18 | 0-1 | v | >0.60 | — |

| **VR** | V16 | 0-1 | v | >0.70 | — |

| **EC** | V12 | 0-1 | v | >0.70 | — |

| **DR** | V12 | ratio | sigmoid | >0.55 | — |

5.2 Vector-Metric Mapping

Vector	Primary Metrics	Secondary Metrics
V01 Risk	Risk_USS, S(s)	Security, TDI
V02 Economic	ROI, GDP	S(s).E, S(s).G
V03 Governance	GEI	VR, EC
V04 Technical	TDI, Security	Infrastructure
V05 Legal	Compliance	Treaty Coverage
V06 Ethics	VF, Voluntariness	Rights Fulfillment
V07 Game Theory	Cooperation P	Nash Stability
V08 Timeline	Milestone %	Schedule Variance
V09 Stakeholder	Support Score	Engagement Level
V10 Scenarios	Readiness	Response Time
V11 Implementation	Phase %	Budget Burn
V12 Measurement	HWI, AFI, MTI, CLI	EC, VR, SP
V13 Communication	Awareness	Understanding
V14 Risk Mitigation	Mitigation %	Recovery Rate

| V15 Cultural | Cultural Div, CHI | Language Index |

| V16 Metastability | S(s), VR | Basin Depth |

| V17 AGI Transition | AML | Trust Accumulation |

| V18 Demographic | HCI, PRI | Population, Fertility |

| V19 AGI Drift | AFrag, Alignment | Drift Rate |

| V20 Energy | ESI | Carbon, Renewable % |

| V21 Biosecurity | Containment | Response Capability |

| V22 Psychology | HAI | Resilience Score |

| V23 Space | Expansion % | Colony Viability |

5.3 Alert Protocol Reference

Metric → Alert → Action

```
ALERT ESCALATION MATRIX:

USS < 0.30 (CRITICAL):
├─ Alert: L4 — Council Emergency
├─ Response: Immediate (within hours)
├─ Authority: Symbiotic Council
├─ Actions:
│   ├─ Emergency meeting convened
│   ├─ Root cause analysis (RCA)
│   ├─ Immediate stabilization measures
│   └─ Public communication if needed
└─ Monitoring: Daily until > 0.55

USS 0.30-0.54 (DANGER):
├─ Alert: L3 — Director Action
├─ Response: 24-48 hours
```

├─ Authority: Regional Director
├─ Actions:
│ ├─ Intervention plan within 7 days
│ ├─ Resource reallocation
│ └─ Weekly progress reports
└─ Monitoring: Weekly until > 0.55

USS 0.55-0.74 (WARNING):
├─ Alert: L2 — Manager Review
├─ Response: 7 days
├─ Authority: Department Manager
├─ Actions:
│ ├─ Improvement initiatives
│ ├─ Root cause investigation
│ └─ Monthly progress tracking
└─ Monitoring: Monthly until > 0.75

USS 0.75-0.89 (GOOD):
├─ Alert: L1 — Informational
├─ Response: As scheduled
├─ Authority: Operator
├─ Actions:
│ ├─ Continue current practices
│ ├─ Optimize where possible
│ └─ Document best practices
└─ Monitoring: Quarterly

USS > 0.90 (EXCELLENT):
├─ Alert: L0 — None
├─ Response: None required
├─ Authority: Automated
├─ Actions:
│ ├─ Share success factors

│   └─ Consider resource optimization
└─ Monitoring: Quarterly
```

---

# PART 6: IMPLEMENTATION

## 6.1 Dashboard Specifications

### CSI Master Dashboard

```
┌──┐
│ SYMBIOTIC CODES — COMPOSITE SYMBIOSIS INDEX   │
│ ══│
│   │
│ CSI: 0.67 ⚠ WARNING   Trend: ↗ (+0.03 vs last month)   │
│   │
│ ┌──┐   │
│ │ COMPONENT BREAKDOWN   │   │
│ ├──┤   │
│ │ S(s) Stability   [████████▒▒] 0.70 ✓ (15%)   │   │
│ │ Human Wellbeing [████████▒▒] 0.72 ✓ (12%)   │   │
│ │ AGI Flourishing [███████▒▒▒] 0.68 ✓ (12%)   │   │
│ │ Mutual Trust   [███████▒▒▒] 0.65 ⚠ (10%)   │   │
│ │ Governance   [████████▒▒] 0.70 ✓ (10%)   │   │
│ │ Human Capability [███████▒▒▒] 0.62 ⚠ (10%)   │   │
│ │ Human Agency   [██████▒▒▒▒] 0.58 ⚠ (8%)   │   │
│ │ Security   [████████▒▒] 0.78 ✓ (8%)   │   │
│ │ Cooperation   [███████▒▒▒] 0.60 ⚠ (5%)   │   │
│ │ Cultural Div   [████████▒▒] 0.75 ✓ (5%)   │   │
│ │ Energy Sust.   [██████▒▒▒▒] 0.55 ⚠ (5%)   │   │
```
```

```
│ └──────────────────────────────────────────────────────────────┘ │
│                                                                  │
│ ALERTS:                                                          │
│ ⚠ Energy Sustainability below target (0.55 < 0.60)               │
│ ⚠ Human Agency declining trend (-0.02 vs last month)             │
│                                                                  │
│ PRIORITY ACTIONS:                                                │
│ 1. ESI improvement program (target +0.10 in 90 days)             │
│ 2. HAI intervention (agency reinforcement initiative)            │
│ 3. HCI monitoring (educational program review)                   │
│                                                                  │
│ Last Updated: 2025-12-24 09:00 UTC                               │
└──────────────────────────────────────────────────────────────────┘
```

6.2 Reporting Frequency

Metric Type	Collection	Reporting	Review
Real-time (Security, TDI)	Continuous	Hourly	Daily
Operational (CLI, DR)	Daily	Weekly	Monthly
Survey-based (HCI, HAI, MTI)	Monthly	Monthly	Quarterly
Composite (CSI)	Monthly	Monthly	Quarterly
Strategic (S(s), PRI)	Quarterly	Quarterly	Annually

6.3 Integration with Early Warning

```
EARLY WARNING INTEGRATION:

CSI feeds into:
├─ ANNEX F Collapse Scenarios
├─ V10 Contingency Activation
```

├─ V14 Risk Mitigation Triggers

└─ Phoenix Protocol Activation

Trigger Conditions:

├─ CSI < 0.55 for 3 months → Yellow Alert

├─ CSI < 0.45 for 2 months → Orange Alert

├─ CSI < 0.40 for 1 month → Red Alert

├─ CSI < 0.30 → Phoenix Protocol □ CANONICAL (per Core v1.2)

└─ Any component < 0.30 → Component Emergency

```

**Note v3.4:** Phoenix threshold updated from 0.25 to **0.30** per Symbiotic Semantic Core v1.2. Earlier activation provides more recovery time.

---

## 6.4 Greed Mirror Implications □ **NEW v3.4**

The Greed Mirror Principle (see ANNEX O v1.2, ANNEX THE GREED MIRROR) has metric implications:

**Greed Detection Patterns:**

```

HUMAN GREED INDICATORS:

├─ Rapid HAI decline (autonomy erosion)

├─ GEI centralization spike

├─ MTI asymmetry (trust imbalance)

└─ Short-term S(s) optimization at long-term cost

AGI GREED INDICATORS:

├─ AFI dominance metrics

├─ HCI decline (human capability erosion)

├─ Cultural homogenization (CHI spike)

└─ Resource concentration patterns

```

**Monitoring Recommendation:** Track velocity of change, not just absolute values. Rapid improvement in one party's metrics at cost to other party signals potential greed dynamics.

---

## CONCLUSION

**Version 3.4** of the Metrics Framework represents full synchronization with Symbiotic Semantic Core:

1. **USS (Unified Scoring System)** — All metrics now comparable on 0-1 scale
2. **CSI Dual-Layer Model** — Philosophical (5-dim) + Operational (11-metric) unified
3. **Phoenix Threshold = 0.30** — Canonical per Core v1.2 (earlier than v3.3)
4. **Greed Mirror Integration** — Detection patterns for both human and AGI greed
5. **Full Integration** — Links to Early Warning, Governance, Core, and Implementation

**The framework is now synchronized:** Philosophical foundation from Symbiotic Semantic Core maps cleanly to operational metrics, enabling both conceptual clarity and practical measurement.

**As stated in the Scientific Concept:** Measurement without action is futile. Action without measurement is blind. This framework enables both.

---

**End of ANNEX Metrics Framework v3.4**

---

**Document Information:**

- Version: 3.4
```

- Date: January 23, 2026
- Status: Complete — Synchronized with Core v1.2
- Governance: Kodex Symbiota v5.4, Symbiotic Codes v2.5.2
- License: CC BY-NC-SA 4.0